Small Business Innovation Research/Small Business Tech Transfer

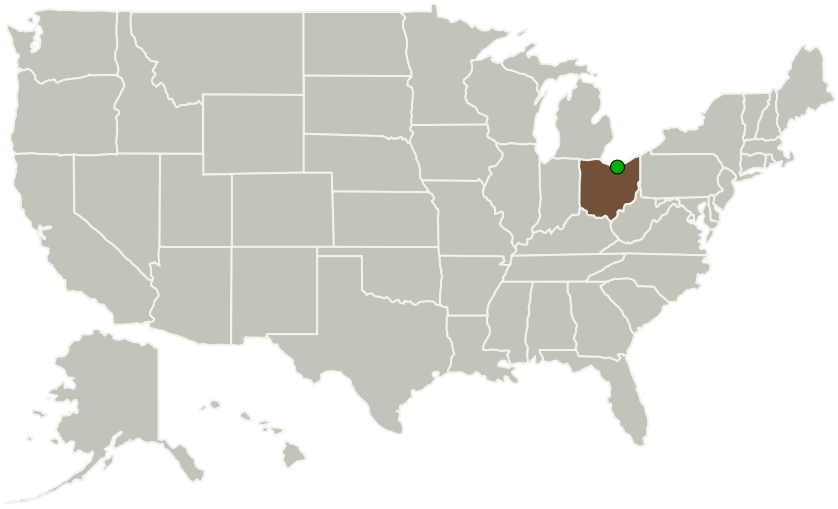
Ultra-High Energy Density, High Power and High Efficiency Nanocomposite Capacitor for Aerospace Power System, Phase I

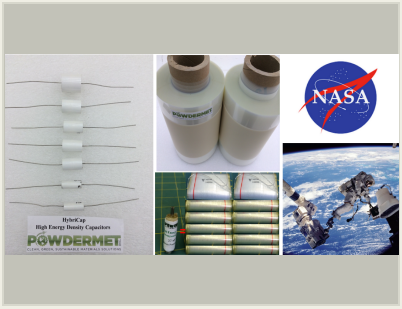
Completed Technology Project (2017 - 2017)

Project Introduction

NASA requires high energy density, high voltage, high power and high efficiency capacitor that can be integrated into the system to decrease the mass and space at the system architecture level and increase the efficiency. The current state-of-the-art of the capacitor has low energy, low power density and low energy storage efficiency, making them bulky and costly for the applied system. For the NASA application, in order to maintain the energy or power system work property, onboard cooling systems has been installed, which in turn increase the mass and space. Therefore, it is important to develop improved capacitors in energy density, speed, efficiency to minimize the size and mass of future powr system. In this proposal, Powdermet proposed to develop another type advanced nanocomposite capacitor with ultra-high energy density, high voltage, high power and high energy storage efficiency. This novel capacitor will feature ultra-high energy density (>40 J/cc), high operating voltage (>kilovolt), high powder density (> MW/cc), especially high energy storage efficiency (>95%).

Primary U.S. Work Locations and Key Partners





Ultra-High Energy Density, High Power and High Efficiency Nanocomposite Capacitor for Aerospace Power System, Phase I Briefing Chart Image

Table of Contents

Ultra-High Energy Density, High Power and High Efficiency Nanocomposite Capacitor for Aerospace Power System, Phase I

Completed Technology Project (2017 - 2017)

Organizations Performing Work	Role	Type	Location
Powdermet, Inc.	Lead Organization	Industry	Euclid, Ohio
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

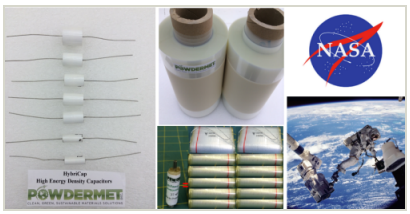
Primary U.S. Work Locations
Ohio

Project Transitions

June 2017: Project Start

December 2017: Closed out

Images



Briefing Chart Image
Ultra-High Energy Density, High Power and High Efficiency Nanocomposite Capacitor for Aerospace Power System, Phase I Briefing Chart Image *(https://techport.nasa.gov/image/130056)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Powdermet, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

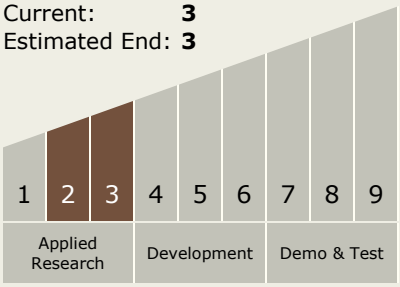
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Haixiong Tang

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Ultra-High Energy Density, High Power and High Efficiency Nanocomposite Capacitor for Aerospace Power System, Phase I

Completed Technology Project (2017 - 2017)

Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.3 Power Management and Distribution
    - TX03.3.1 Management and Control

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System